



Name:

Date:

## Worksheets - Grade 8 Weaselhead Freshwater Systems Program

### Activity Title: Watershed Lookout

Time required: 10 Minutes

Leader: Naturalist

Materials needed: pencil and paper

*Background: It is important for the students to have a feel for the look and shape of the watershed of the Elbow River as they will be learning about it. This program is based on understanding what a watershed is. Drawing and describing it will help students to understand the concept..*

#### Direction

1. Looking out over the valley make a sketch of the watershed (the drainage basin) of the river

2. In a few sentences describe the Elbow River watershed. For example, how big is it, how long is the river? Is it a valley?

### Activity Title: Water Quality Challenges

Time required: 10 minutes

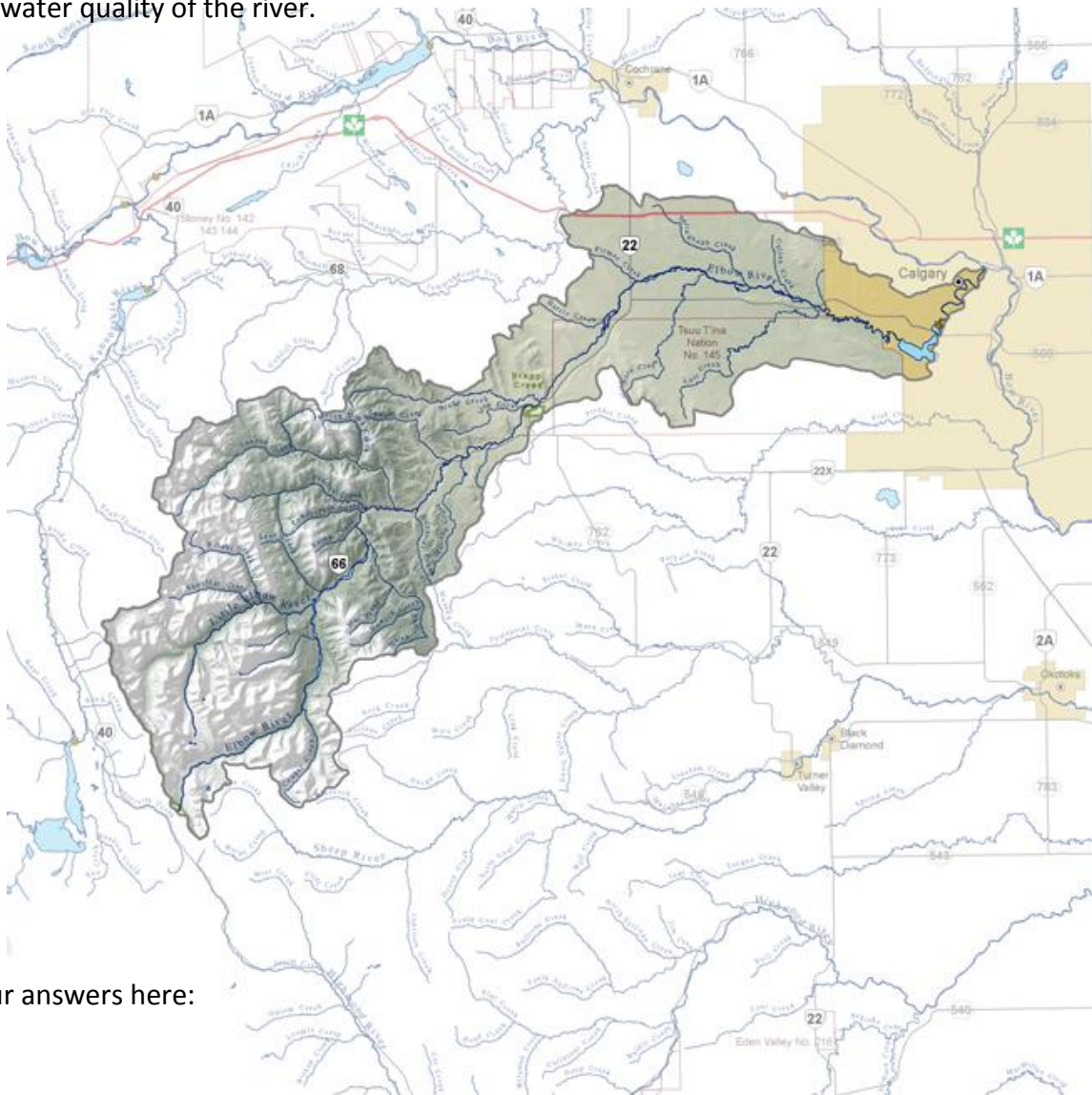
Leader: Naturalist

Materials needed: map of the Elbow River watershed (below) and pencil.

*Background: This activity allows students to think about what features and activities within the watershed can impact water quality. Finding potential sources of natural and man-made pollution themselves will help the students to remember them and think about those things in the future. It also gives them experience looking at maps.*

Directions:

1. Looking at the map of the Elbow River watershed below list the activities that may affect the water quality of the river.



List your answers here:





**Activity Title: Elbow River Flora**

Time Required: 10 minutes

Leader: Naturalist

Materials needed: pencils, workbook, plant guides (provided)

*Background: This activity encourages students to notice the great variety of plants that grow along the Elbow River. It is important for them to take note of the different plants and realize that they all play a role in the riparian ecosystem. It will also teach them the names of plants and to be observant.*

**Directions:**

Examine the flora (plants) along the shore of the Elbow River. Draw and identify three plants observed.

Plant a)

Plant b)

Plant c):



<b>Activity Title: Wetland Flora</b>									
Time Required: 30 minutes	Leader: Naturalist								
Materials needed: pencils, workbook, plant guides (provided)									
<i>Background: This activity introduces students to the great variety of wetland plants in the Weaselhead. It emphasizes the importance of these plants and allows the students to identify them.</i>									
<p>Directions:</p> <p>Examine the flora (plants and algae) along the shore and in the water at each wetland. Draw and identify three plants (one on the shore, two in the water) observed at each wetland.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;"><b>Site #1 Oxbow</b></th> <th style="width: 50%; text-align: center;"><b>Site #2 Beaver Lagoon</b></th> </tr> </thead> <tbody> <tr> <td>On the shore Name:</td> <td>On the shore Name:</td> </tr> <tr> <td>In the water Name:</td> <td>In the water Name:</td> </tr> <tr> <td>In the water Name:</td> <td>In the water Name:</td> </tr> </tbody> </table>		<b>Site #1 Oxbow</b>	<b>Site #2 Beaver Lagoon</b>	On the shore Name:	On the shore Name:	In the water Name:	In the water Name:	In the water Name:	In the water Name:
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**Question :** Wetland plants act as natural filters because they can absorb excess nutrients and heavy metals. For example, marsh plants use nitrogen and phosphorus to grow, and cattails can absorb and store heavy metals such as lead. How can we use wetland plants to improve water quality?

**Your answer:**



### Activity Title: Water Velocity

Time Required: 45 minutes

Leader: Naturalist

Materials and people needed:

- Three sticks, stopwatch/timer
- Thrower (person who throws the stick)
- Timers (at least two people so you can take an average of time)
- Yeller (person who yells to start timing when stick passes the start line)
- Pacer (person who paces out 10m)

*Background: The purpose of this activity is to show the students how to do a rough measurement of the velocity of the river.*

Directions:

Water velocity (m/sec) is how fast the water is travelling. Water velocity can be measured in a more accurate way with a current meter but today your group will determine water velocity using the stick method.

1. Find three sticks.
2. Pace off 10m. Mark the start and the end of 10m with people in your group.
3. Determine the Throwers position by pacing 2m above your start point and have the Thrower stand there with the stick. This is the Thrower's position.
4. The two Timers, with their watches ready, must stand at the end point (the 10m mark).
5. The Yeller must stand by the start point (0m mark).
6. When everyone is in position, the Thrower will throw the stick into the water; try to throw the stick into the fastest moving water observed and at right angles to the bank.
7. When the stick passes the Yeller he/she yells to the Timers to start timing.
8. Once the stick passes the end point, the Timers will stop timing and record how much time (in seconds), it took for the stick to travel 10m.
9. Repeat this step two more times and determine the average time it takes for a stick to travel 10m.

**Thrower**-----2m-----**Yeller**-----10m-----**Timers**  
 (start point) (end point)

Calculation:

You have found how long the stick took to travel 10m. From this you can calculate velocity in m/sec.

**Example: If the stick took 20s to travel 10m, it would take 2s to travel 1m. To find how far it would go in one second you take the inverse of this i.e. 1 divided by 2 = ½ m/s or 0.5m/s.**

	Time to go 10m (sec)	Time to go 1m (sec)	Velocity (m/s)
Trial 1			
Trial 2			
Trial 3			
<i>Average</i>			



**Activity Title: Abiotic Water Quality Factors**

Time Required: 45 min

Leader: Naturalist

Materials Needed: Workbook  
Pencil  
Water quality testing kits  
Thermometer

*Background: This activity shows students the different factors that influence water quality. It teaches them that there are many important abiotic factors that should be studied when examining water quality, including chemical and physical factors. It will also allow them to compare abiotic water quality factors with biotic ones (next activity).*

Directions: Fill in this table with the help of the materials provided by the naturalist.

	Site #1 <b>Oxbow</b>	Site #2 <b>Beaver Lagoon</b>	Site #3 <b>Elbow River</b>
<b>Turbidity: 0 - 10</b>			
<b>Water temperature:</b>			
Surface (°C)			6°C
Middle (°C)			5°C
Bottom (°C)			4°C
<b>Water Velocity (m/s)</b>	0 m/s	0.7 m/s	
<b>Dissolved Oxygen (ppm)</b>			7.5 ppm
<b>pH</b>			
<b>Nitrate (ppm)</b>			<2.5 mg/l
<b>Nitrite (mg/l)</b>			0 mg/l
<b>Ammonia mg/l)</b>			0 mg/l
<b>Phosphate (ppm)</b>			



**Activity Title: Biotic Water Quality Indicators**

Time Required: 45 min

Leader: Naturalist

Materials Needed: Nets  
Containers  
Pencils

(In this activity the Naturalists and helpers will catch the invertebrates so not too many will be taken).

*Background: This activity shows students the importance of invertebrates and shows student that there are many forms of life in fresh water that most people are unaware of. It teaches them the importance of aquatic invertebrates as water quality indicators.*

Directions:

1. Draw and identify 3 aquatic invertebrates observed at each wetland.

Site #1 <b>Oxbow</b>	Site # 2 <b>Beaver Lagoon</b>
Name:	Name:
Name:	Name:
Name:	Name:





### Bioindicators

Aquatic invertebrates can be used as bioindicators. In general, species that are important bioindicators need high oxygen levels, neutral pH, cold water, and low levels of nitrates, nitrites, ammonia, heavy metals and other pollutants. Invertebrates that can survive low oxygen, warmer water, pH ranges outside of neutral and more pollution have a different physiology that is less sensitive to these factors or have special adaptations that allow them to cope, for example mosquito larvae have 'snorkels' that poke out of the water and allow them to breathe air.

Pollution tolerant	Somewhat Pollution Tolerant	Pollution Intolerant bioindicators
Midge larvae Backswimmers Water Boatmen Water Striders Leech Lunged Snails Mosquito larvae	Dragonfly nymph Damselfly nymph Cranefly larva Giant Water Bugs Beetles and beetle larva	Mayfly nymph Caddisfly larva Stonefly nymphs Gilled Snails Scuds

1. Which bioindicators did you see in the Oxbow?
  
2. Which bioindicators did you see in the Beaver Lagoon?
  
3. Further up the food chain in a healthy stream, what eats Mayfly nymphs and Caddisfly larvae?
  
4. Do the **biotic** water quality indicators seem to agree with the **abiotic** water quality tests that you measured today? Is there anything that did not match up?

